Solubility of Low Volatile Hydrocarbons in Supercritical Ethane

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Supercritical fluid processes are being used in a lot of applications, including hydrocarbon systems, such as for fractionation of aromatic heavy oil [1], extraction of petroleum hydrocarbons from soil [2], etc. This is due to the special properties of supercritical solvents. Carbon dioxide is an option for extraction of heavy hydrocarbons [3] since CO_2 has many advantages: it is a green solvent, it has a low critical temperature, it is non-flammable, non-toxic, economic, *etc*. In addition, the solubility of heavy hydrocarbons could be improved with the use of cosolvents or entrainers [4]. However, it is important to evaluate other solvents, like light hydrocarbons, in order to establish the best option for extracting heavy hydrocarbons.

In this work we report the solubility of n-octacosane in ethane and squalane in ethane both at 308 and 323 K, in the pressure range 10 to 20 MPa. The experimental studies were carried out in a flow apparatus. The extracted solute was determined gravimetrically and the solubility data was determined to ± 0.0002 mole fraction. The solubility of the hydrocarbons increases as pressure increases but the functionality with pressure shows a special behavior. The solubility data were correlated with the Chrastil equation through density values of ethane.

From a comparison of the solubility of n-octacosane in ethane at 323 K with solubility data reported in the literature with CO_2 at the same temperature [5] it was possible to establish that the solubility of the hydrocarbon in ethane is larger two orders of magnitude than that of CO_2. This result clearly shows that the like dissolves the like.

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